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PHOTOGRAPHY AT HOME

J. A. Tennant

1846

A HANDBOOK TO THE USE OF THE CAMERA IN THE HOME FOR PLEASURE AND PROFIT; WITH WORKING METHODS AND RELIABLE FORMULÆ

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Chapter I

THE HOME AND ITS POSSIBILITIES

TO the majority of amateurs, photography is a hobby to be ridden only on fair days and in pleasant weather; or it is thought of chiefly as a means of securing records of places and things seen during tramps abroad. But it is more than this, and those who follow photography merely as a summer pastime know but the half of it. In these pages we will discuss something of the other half, and set forth, in a plain and practical way, what the amateur should know about photography at home and its possibilities for the enlivening of the dull days or long winter evenings.

It has always seemed strange to me that, among the hundreds of books published for photographers, there should be less than half-a-dozen dealing with photography as a home craft. Amateur portraiture, photography by artificial light, the photographing of interiors, still life and subject pictures, flowers and fruit, copying and enlarging, printing on fabrics and the making of photo enamels on china ware, with the innumerable applications of photography in decoration; all these are essentially home arts, and well within the capabilities of the average amateur equipment. Hence this attempt to make a little book about some of them.

More than this, I have long desired to interest the stay-at-homes, our womenfolk, in the gentle art of making pictures of that world wherein they hold the chief place. Who so well fitted as they, in patience and opportunity, to picture that supremely interesting panorama of life of which the home is the theatre? It is a world sadly neglected by photographers, but abounding in the most delightful picture material. The children at their play, the rooms which echo with their merry laughter, the toy corner where the mimic general, the rag doll, the grizzly bear and the woolly lamb, with a thousand other curios, are so tenderly laid away when bedtime comes. The master of the house enjoying a quiet smoke, the grandmother nodding in her easy-chair, the music lesson and little social gatherings—all these are simple subjects for the camera at home, full of pleasure in their interpretation, and afterward.

Beyond these things are the more prosaic business possibilities open to women well informed and skilful in the practice of photography. It is true that these possibilities have been all too glowingly enlarged upon by certain writers for the press, but they are not to be too lightly passed over. The first place in American portraiture today is held by a woman who, but a few years ago, began the practice of photography at home as an amateur. It is needless to remark that success of this sort results only from long and thorough experience in a special line of work, and it is equally obvious that photography at home offers peculiar advantages in the gaining of this experience at odd times and in leisure hours.

PHOTOGRAPHY AT HOME

Let us begin with the understanding that photography at home presents no difficulties which cannot be overcome by ordinary intelligence, a little contrivance, and a few helps here and there. At first we may content ourselves with such apparatus as we already possess. Later we will see that special aids are desirable for special kinds of work, and that certain commercial conveniences are useful, and well worth their cost as saving time and labor. These we will discuss in their proper place. The one thing essential is a thorough knowledge of the conditions peculiar to photography indoors, and this will be our first consideration.

Chapter II

THE QUESTION OF ILLUMINATION

ACCUSTOMED to working out-of-doors during the bright days, the amateur's first difficulty in attempting photography of any kind at home is to realize the immense difference between the intensity (photographic power) of light indoors and out. After making an exterior view with an exposure of $\frac{1}{25}$th of a second, it is incomprehensible that, coming indoors to photograph a well-lighted room, one must multiply the out-door exposure hundreds of times to get a satisfactory negative. This is why at-home photographs are, usually, so wofully under-exposed, so lacking in gradation, and so excessive in their contrasts. There is so much light out-of-doors, and it is so widely diffused; indoors the illumination is so unequal, and its distribution so unsatisfactory. The eye readily accommodates itself to the wide difference between this and that; the lens and plate, on the other hand, are painfully exact in their statement of it.

The first step toward success, therefore, must be to familiarize oneself with the altered conditions of illumination. We must know how light acts when confined, as in a room; and how feebly it penetrates the shadows thrown by objects in its path within a circumscribed area. This is the bottom problem in

all photography indoors, whether we use daylight or artificial light. When it has once been mastered, everything else will be easier, and our percentage of failures will be materially lessened. This familiarity must come by observation and experience—well-worn advice, perhaps, but very much needed, as the average at-home photograph tells us. The simplest way to get this experience is to make a series of interiors of the home and, as a contrasting example, an exterior view of the house. This will teach us many things worth the knowing. First, however, let us see what may be learned by observation alone. An actinometer will be helpful, in fact, it is an indispensable aid in all indoor work with the camera. Lest the strange name make the novice fearful, I hasten to explain that an actinometer is simply a little instrument which measures the actinic (photographic) power of the light.

Exposure meters, which most amateurs know about, are actinometers, fitted with scales or tabulated figures applying what the actinometer says to give the exposure required under certain conditions, with this or that plate and lens aperture. These exposure meters save considerable time and prevent failures. Every amateur should possess one, and will be richer when he is familiar with its purposes and practical use.

A simple actinometer may be made at home for experimental purposes. To make it, procure a few 4 x 5 inch pieces of slow bromide paper. Immerse each sheet for five minutes in a ten per cent solution (45 grains to each ounce of water) of potassium nitrite (not *nitrate*). This should be done by lamp or weak

gaslight, and the paper dried in darkness. When dry, cut the sheets up into strips one-quarter by three inches, and store them in an air-tight box, such as the tin tube in which platinum paper is sold. Expose one of the strips to diffused daylight until it darkens to a slaty-blue color, and match this with watercolors on a piece of white paper. This will form what is known as the *standard tint.* Now get a piece of thin white glass, and a piece of cardboard, each one by three inches. At each of the four corners of the card paste narrow strips of thick paper, so that the card (when, later, attached to the glass) is slightly separated from it except at these four raised corners. Across the top of the card, paste a piece of the standard tint about one-half inch wide. Fasten the card and glass together with black needle paper so as to exclude all light, but leaving the ends open. Cut an opening one-quarter by three-quarters of an inch through the black paper at the top of the glass, so as to show the standard tint beneath. Now slip a strip of the sensitive test paper through between the card and glass until it meets or crosses the standard tint, and the actinometer is ready for use.

If we expose the actinometer to diffused light (at a window), the sensitive test paper gradually darkens until it matches the standard tint. By noting, with a watch, the time required for the paper to reach the standard tint in color, we get a figure in seconds or minutes which represents the *actinometer time* of the light at that hour and in that place. In this way we measure the intensity of the light. If we compare this actinometer time with the time required to get

the standard tint in another place, where there may be more or less light, we get a definite idea of the relative intensity of the light in both places. If, for instance, our first observation gives us the standard tint in six seconds, and a second observation in another room requires twelve minutes to give the tint, we know that the light there is 120 times weaker than at the window where we made the first observation. Hence it follows that if at the window one second is the correct exposure for a certain plate and lens aperture, we must give 120 seconds, or two minutes exposure, with a plate of the same rapidity and the same lens aperture, in the room where we made the second actinometer test. This shows the usefulness of the actinometer as a light measurer. If we make a tour of the rooms in the house between 11 a.m. and 1 p.m., when the light is fairly constant, the actinometer times given by the tests here and there with the actinometer, will give us a fairly correct idea of the relative exposures needed in each room.

The calculation of exposures, however, depends not only on the intensity of the light, but also upon the character of the subject, the speed of the plate, and the lens aperture or stop used. Of these four essential factors the home-made actinometer gives us but one, so that its usefulness is very limited. What we need is a series of tables enabling us to apply the actinometer figures to the varying conditions of each exposure proposed. These calculations are part of all exposure meters or exposure tables: hence it is better to buy an exposure meter in the beginning, and save ourselves the worry of calculation and guesswork.

For outdoor work I prefer Todd's *Tables* before any meter; but for indoor work, Watkins' or Wynne's meters will be found more satisfactory. There is little choice between these two useful instruments, but I have mislaid my Watkins, so we will use the Wynne meter wherever needed in the preparation of these pages.

Let us take a Wynne meter, and make a few tests about the house in order to get a good grasp of this important detail of illumination and exposure. It is a November day, at noon. The sun is high and the sky is filled with white clouds. We propose to use a rapid plate, about speed F90 on Wynne's list. Exposing the meter to diffused light, *outdoors*, we get the standard tint in 24 seconds. This is called the actinometer time. Placing the speed number of the plate (F90) against the figure 24 on the dial of the meter, we see at a glance that the exposure required is $\frac{3}{16}$ths second, with the lens at $f/8$. The exposure required with every other diaphragm is shown on the meter-dial at the same time. Going *indoors* we expose our meter in a well-lighted room, facing the windows, and get the tint in 8 minutes. The exposure indicated with $f/8$ is $\frac{1}{16}$th minute, say 4 seconds; with $f/16$, 15 seconds; and with $f/22$, 30 seconds. In another room, less abundantly lighted, we get the standard tint in 27 minutes, indicating exposures of 2 and 4 minutes with stops $f/22$ and $f/32$ respectively. In an upper hallway the actinometer time is 64 minutes, necessitating an exposure of 7½ minutes with $f/32$, supposing the same brand of plates to be used throughout.

By this time the sun has come out and we return to

the well-lighted parlor to see whether we dare attempt a group of two children. A light background and a white side reflector are arranged near a window to form a small studio. The group will be two feet from the window, and lighted by the midday sun filtered direct through a white muslin blind. The plate is an extremely rapid brand, listed by Wynne at F111. Exposed in the shadow of the group the meter gives us the tint in six minutes. This indicates an exposure of 2 seconds for a normal subject with the lens at *f*/8. We remember the rule to multiply normal exposure by 1½ for portraits indoors, and give 4 seconds as a full exposure. Without sunlight, and with the blind lowered from the top, the actinometer time is 8 minutes, and the exposure, with *f*/8, is six seconds. Substituting a subject in dark dress, and a medium background, the actinometer time is sixteen minutes, and the exposure must be nine or ten seconds. Or it is night, and we want to photograph the table set for a small supper party before the guests arrive. We desire only the table and its arrangement; all else may be hidden in shadow. It is lighted by a four-jet chandelier, and on the table is a befrilled lamp with a pink shade. We expose the meter, facing the light source, in the shadow of the rose-bowl near the centre of the table. Using the lighter of the two tints on the meter-dial, the actinometer time is one hour and, taking the speed of our non-halation plate as F45 when used with this lighter tint, we give an exposure of 16 minutes with *f*/22. Had we used a "backed" orthochromatic plate, an exposure of 12 or 15 minutes would have been ample. The quality

of the illumination is an important factor here. With ordinary gaslight rapid isochromatic plates will shorten the exposure. With incandescent gaslight, and either plain or orthochromatic plates, the exposure will be shorter than required by ordinary yellow gaslight.

Let us now see what the meter will tell us about the falling away of the illumination in a room as we work at various distances from the window. At four feet distant, we get the standard tint in 3 minutes (meter facing the light of the undraped window); at 8 feet distant in 12 minutes; and at 12 feet distant in 20 minutes. In the middle of the room the actinometer time is 15 minutes; this with *f*/22 indicates an exposure of one minute, with a plate marked F90 on Wynne's list. But we want to get all the detail under a certain black oak table. Placing the meter in the deepest shadow where we want detail, we get the tint in 24 minutes, so that our exposure must be 3 minutes with *f*/22 (normal exposure multiplied by 2), and we must control the contrasts in the negative by development or reduction with ammonium persulphat.

In this way we may gain a practical knowledge of the problem of exposure indoors without waste of plates or material, and when we come to photographing interiors will be able to handle them more intelligently than was possible without this knowledge.

Chapter III

HOME INTERIORS BY DAYLIGHT

APART from the details of illumination and exposure, the chief things to be considered in photographing home interiors are the lens, plate, height of camera and point of view, and the general arrangement of the room. As the making of a series of interiors will give us much profitable information applicable to all indoor work, we will deal with this branch of at-home work first. If we are reasonably successful, our negatives will afford material for desirable souvenirs for distant friends, and in any event, we will learn many things well worth knowing.

The amateur is generally obliged to make the best he can of the apparatus he has, so that little needs to be said about choice of apparatus and the like. Where choice is possible, however, a square-bellows field camera is preferable to a hand camera. A level or plumb indicator is indispensable if we want to make sure of vertical lines in dark interiors, where the ground glass image is almost invisible. The rising and falling front, now part of almost all folding cameras, will be found useful to increase or cut off foreground or ceiling as may be desirable. Sometimes, in using extreme wide-angle lenses for small interiors, a camera

with a base board folding down at the front, or with a device for bringing the camera body forward on its bed, is necessary to prevent the front of the base-board intruding upon the field of the lens. If we use a tapering or conical bellows, care must be taken to secure the first few folds well forward by fastening them to the front-board, so that they may not obstruct the image on its way to the ground glass or plate.

The lens is an important item in interior work, because on the relation of its focal length to the base measurement of the plate used depends the amount of view included in the negative. This is known as the angle of view, and may be determined by dividing the base measurement of the plate by the equivalent focus of the lens. If we use a lens whose focal length is greater than the base line of the plate, as a 7-inch lens on a 4 x 5 plate, the angle of view will be narrow, not more than 40°. This practically means that we cannot include in our view more than one side or a corner of the room. A lens of 5-inch focal length, used on a 4 x 5 plate, will include an angle of view of 53°. The same lens used on a 6½ x 8½ inch plate, and stopped down considerably, would include everything within an angle of 80°. Whether the negative would be well defined or equally lighted at the corners and centre of the plate is another story. With a lens of 3½-inch focus, used on a 4 x 5 plate, we can include everything within an angle of over 70°. Hand camera lenses for 4 x 5 plates generally have a focal length of 6¼ inches, which includes a medium angle of view for average work indoors and out. For interiors of small rooms, or wherever the space is confined, a special

wide-angle lens is indicated, such as Gray's *Extreme Angle Periscope*, which gives an angle of over 100° on the plate for which it is listed. The Velostigmat Wide Angle, *Series III* and the anastigmat of Goerz, *Series IV.*, *f*/11; Zeiss, *Series V.*, *f*/18; Orthostigmat, *Series III.*, *f*/6.8, all giving a full angle, largest aperture, of 90°, offer evident advantages in definition and illumination for this class of work.

As far as plates are concerned, we can use any plate we may have at hand, but certain plates are more suitable than others. Among the difficulties encountered in indoor photography that known as halation is perhaps one of the most troublesome, and it may be largely obviated by our choice of the plate or film used in making the negative. So much has been written about halation that I propose to touch upon it very briefly here. As every amateur knows when we photograph against the light, as in an interior view where we are obliged to face the camera to a window, the intense light spreads beyond its proper boundaries, and a hazy blur or halo surrounds objects in close proximity to the light. This blur, known as halation, is seen around the window-frame, draperies, and encircling whatever is near the window and between the camera and the light. It is caused by the spreading of light in all directions among the particles of the sensitive film of our plate, and aggravated by the light being again thrown back into the film by reflection from the glass support, after it has once passed through the film and reached the plate. Of course, wherever there has been light action, there will be reduction on development, and the practical result

is the light blur referred to above. The defect can be overcome, almost completely; first, by coating or "backing" the glass side of the plate with an easily removable non-actinic composition which effectually prevents the reflection of the light after it has completed its work in the film; second, the use of "non-halation" plates, such as the Defender, N. H. Ortho or Seed D.C., which are specially coated first with a "slow" and then again with a "fast" emulsion, so that the exposure is completed before the light reaches the glass support; and third, by the use of films instead of plates, especially roll films which have a strip of non-actinic paper behind them, by which the principal cause of halation is removed. The introduction of Kodak spools for 6 film exposures brings the use of films for at-home work before the amateur in a practical and economical way, obviating, as they do, the necessity of making twelve exposures before development.

To "back" an ordinary or orthochromatic plate is easier than to describe how it is done. A dozen or two should be "backed" at one time and put away (after the "backing" is thoroughly dry) until required for use. Here is the method generally advised. First we need a composition that is effective, which will not injure the plate-holders, and which may be easily removed during or before the development of the plate. We may employ a home-made mixture as follows: thoroughly mix, caramel, 1 ounce; strong solution of gum arabic, 1 ounce; burnt sienna, 2 ounces; and alcohol, 2 ounces. See that the mixture is free from grit or lumps, and bottle in a wide-mouthed

bottle. To "back" the plates quickly and without messy handling, procure a piece of stout board three inches larger each way than the plates to be "backed." At the centre of the board glue a piece of canton flannel or velvet of the same size as the plate. Now cut a piece of cardboard the same size as this wooden base, choosing card of the average thickness of a plate, and hinge it to the base-board so that it will fold over it. At the centre of this card cut out a rectangular space exactly the same size as the plate. When it is folded over the base-board this open space will be exactly over the velvet square. The plate to be coated or "backed" is placed, face down, upon the velvet, and fits it closely in this square recess. The backing may now be applied with a small sponge or wad of cotton. See that it is evenly covered, then lift the cardboard and remove the plate, handling it by its edges. Store in a rack and dry in a room free from dust. Of course, this "backing" and drying must be done in a room where no white light can reach the plates. The "backing" device may be used repeatedly, the velvet and cardboard being renewed when needed. Where plates may be bought ready backed for use, we may dispense with this trouble.

The point of view from which the negative is made, the height of the camera, and the general arrangement of the room also need attention. If a characteristic picture of the room can be had without including windows in the view, this should be chosen. Sometimes an open door revealing another room will help the general effect in an interior; or we may be able to work from this adjoining room to better advantage.

Doors, out of the field of view, opening into other rooms well lighted, should be opened during an exposure where a little extra illumination may thus be secured for the interior with which we are engaged. Where only a part of a room can be included in the view care must be taken to see that no prominent piece of furniture is cut in half by the edge of the plate so as to appear inadequately supported. We must avoid placing large or dark pieces of furniture too near the camera, and as far as possible dark objects should be placed so as to be well lighted, light objects being placed in the darkest spaces. In small views the appearance of an ordinary room is generally that it is overcrowded with furniture. Superfluous pieces may, therefore, be removed with advantage, as an amount of space will make the apartment look more roomy. No stiff or formal arrangement of an interior should be attempted; let us have the room as it is in every-day life. But a little observation before exposure will often reveal possible improvements. Some sign of life or occupancy is desirable; a piece of music at the open piano, a violin with its bow, or a guitar laid carelessly in a not too prominent place, or, in a bedroom, a pair of my lady's slippers will give the effect desired.

The height of the camera should not be overlooked. If it is placed too high the lines of the floor will convey the impression of a slope. In a room of ordinary size the lens should not be more than forty inches from the floor.

The inequality of illumination which is inevitable in home interiors may be largely overcome by care

in the arrangement of the room, or by choosing such a time, day or year as gives a favorable lighting. Broad sunlight is rarely advantageous, as giving too forcible contrasts. Sometimes the quiet light of early morning will give the best results. Where there is an abundance of light the window or windows not included in the view may be covered with white sheeting and the light diffused in this way. The broad light upon the floor may be softened by drawing the blinds down from the top. Where we have to deal with strong lighting much may be done by screening the windows during part of the exposure, and giving a brief exposure with the windows in their normal condition toward the end of the total exposure.

When it is desired to include a figure in an interior view, we must use a lens which will permit of a short exposure without sacrificing definition, such as an anastigmat working at *f*/7.7, or even faster, and the figure must be placed so as to receive abundant lighting from the window.

The prevalent color of a room's furnishings also has considerable to do with the question of exposure. Where we have to deal with dark or red or yellow draperies, floor covering, or furniture, the exposure must be lengthened accordingly. A test will tell us more about this than much writing, and where color is concerned, the use of well-backed orthochromatic plates is indicated.

Chapter IV

INTERIORS BY GASLIGHT AND FLASHLIGHT

WE can now take up the question of interior work at night or by artificial light. Is it possible to do anything in this line by gaslight or electric light? Yes, it is possible, but we must be resourceful and patient, and we will need an anastigmat or other quick-working lens if life subjects are to be attempted. For plain interiors any lens will give very pleasing results if properly handled. I have before me as I write an excellent portrait of a child asleep in her crib. It was made by the light of a single gas-jet enclosed in a ground-glass globe, and fixed about 4 feet above and at one side of the crib. The light was not included in the picture. The exposure on a rapid plate was two minutes with a *Goerz* lens at *f*/7.7. The negative is thin, but full of detail. I have another 4 x 5 photograph of a room almost sixteen feet square, lighted by three gas-jets and a lamp or two disposed behind a screen or in a chair to illuminate the darkest spaces. The exposure was 38 minutes with a Ross *W. A. Symmetrical* working at *f*/16. The shadows are somewhat abrupt, and there is a little halation around the gaslight globes. A nonhalation

plate was used, and the halation and harsh lights considerably modified by careful development and the use of ammonium persulphate as a reducer after development and fixing. Another print shows a portrait of a lady reading by a lamp at the table. The face is in shadow and the pose was arranged to give ease and abundant support to the figure. There is evidence of movement in the figure, and the illumination is emphatically local; but by judicious printing a very pleasing picture was secured. The exposure was twelve minutes with a *Goerz* lens working at *f*/11, and a backed orthochromatic plate. These instances show what may be done. In attempting work by gaslight the greatest difficulty lies in the abruptness and heaviness of the shadows, giving disagreeable contrasts. Skilful local lighting by lamps placed here and there, out of the range of the lens, and careful work after the negative has been developed "for all it is worth" will usually moderate these defects. A certain amount of halation is inevitable, but this may be helped in development, and afterwards by treatment with ammonium persulphate, and local reduction of the harsh lights by rubbing with a tuft of cotton charged with alcohol. The exposures required will range from fifteen minutes to two hours, according to the amount and quality of the illumination available, and the character of the furnishings of the room. Where it is possible we must avoid including the lights in our view; this is easy when the room is lighted by side brackets, but difficult when we have to deal with the familiar chandelier hung from the ceiling.

The development of such negatives is an art in itself.

It is not so much a matter of what developing agent to use, as our familiarity with its properties for giving all possible detail without fog. Rodinal, citol, duratol, and metol-hydroquinone are good, but pyro will give us all we need if we handle it right. The others are easier for the amateur. Ammonium persulphate used as a reducer in this class of work is simply invaluable. Its peculiar advantage lies in the fact that it attacks the denser portions of negatives in preference to the finer details of the half tones and shadows. Knowing this we may slightly over-develop our negatives to get all the detail possible in the shadows and leave the lights for after reduction. Fifteen grains of ammonium persulphate to each ounce of water forms a convenient working solution. When sufficiently reduced in this, immerse the negative in a ten per cent solution of sodium sulphite for a few minutes and then wash it well.

Next in order comes interior work by flashlight. By those familiar with the use of flashlight, this form of illumination is preferred before daylight or gaslight as permitting complete control of the illumination of the room, and giving a softer and more diffused illumination. Interiors of small rooms, without life, such as are found in the average home, do not present much difficulty, provided always that we are familiar with the handling of the flashlight employed. The various forms of flashlight, and the apparatus provided for their safe and convenient use, are described on other pages. The reader is advised to read that section carefully before beginning his experiments. Here we will concern ourselves simply with the manage-

ment of the light for the purpose under discussion.

If the room is small, such as an interior twelve by fifteen feet, a single flash from one point will be sufficient with a lens working at $f/16$ or a larger aperture. For larger rooms, or a room with unusually dark furnishings, two flashes may be necessary. In this case, when the room has been thoroughly cleared of the smoke of the first flash, a second flash should be given at a point about four feet away, and in line with the first flash. This will insure abundant and broader lighting. Care must be exercised that the flashes are not too far apart, or confused lighting and crossed shadows will result. We must also be careful that mirrors or picture glasses do not reflect the intense light of the flash. This may be determined by holding a lighted taper at the point where the flash will be made. If the reflection is seen (from the camera) in a mirror or picture glass, these should be tipped at such an angle that the light is no longer visible.

The best general effect is produced by flashing the light about two feet behind, and two or three feet at one side and slightly above the camera. In this way the shadows will be given an agreeable direction, and we will get desirable relief. The lighting may be accentuated by placing a fairly large sheet of white cardboard behind the flash point, and it is well to place a tray or receiver of some kind beneath to catch the odd sparks or burning particles which may fall to the floor after the flash. In choosing a point from which the flash is to be made, we must avoid proximity to lace curtains or similar inflammable fabrics. Focusing may be done with the usual illumination of the room,

or by means of a candle held here and there if the image is not readily seen on the ground glass. The gas, or other illuminant ordinarily used, may be kept burning during all the operations, even during the exposure. When all is ready for the flash, the plate may be uncovered, and the lens or shutter opened; the few seconds intervening before the flash will not harm the plate, but, on the other hand, will assist the general illumination of the view. Immediately after the flash, however, the lens should be covered, and the plate-holder closed.

The light of a single flash being necessarily more or less local, and falling away in intensity very rapidly, a short focus lens (wide angle) will give definite advantage over one of longer focus.

The form of flashlight used must be left to personal choice. For the beginner, or for small rooms, Eastman's *Flash-sheets*, and Eagle or Luxo *Flash-Cartridges* will afford the simplest means of making interiors without the aid of special apparatus other than a reflector and a fire-shovel.

Pure magnesium also offers an excellent light for home work where interiors without figures are wanted, and is less troublesome to handle than a mixture. Highest in efficiency come the *compound* powders, to be used carefully and with scrupulous attention to the makers' instructions. These mixed powders are necessarily explosive and should not be subjected to any friction, or used in a magazine, or any other form of lamp save one specially constructed for their use.

The amount of material required varies with the size of the room, the aperture of the lens, and the

general character of the furnishings. Where these latter are dark in color the normal amount of flash-light powder must be increased fifty per cent. The instructions given with the various commercial powders will generally indicate their capacity, and what amounts to use under varying circumstances. As a general suggestion it may be said that, for a small room and with a lens working at $f/16$, two flash-sheets, or one small cartridge, or twenty grains of magnesium, or forty grains of a compound powder (whichever we may use) will furnish us with sufficient illumination for the average interior.

Where an interior has an attractive outdoor aspect, as when a window overlooks a garden, a pleasing view showing the interior *and* the outdoor scene may be secured by combining daylight and flashlight exposures on the same plate. This may be done by making the flashlight exposure of the interior at night, and leaving the camera (lens covered and plate-holder closed) undisturbed until the following morning, when, from the same spot, and on the same plate, a very brief (second) exposure is given to secure the view seen from the window, which latter should be opened for the moment. It is obvious that, in attempting such a picture, the windows of the room should be opened after the flash-exposure to clear the room of smoke, and the room itself should be locked overnight to insure that the camera shall not be disturbed.

Chapter V

HOME PORTRAITURE BY DAYLIGHT

THE making of portraits at home, by daylight or flashlight, brings the amateur to the most interesting of photographic fields. It is a field as difficult as it is fascinating, which accounts, in part, for the heavy percentage of failures we see in amateur work of this class. If we will abandon, in the beginning, all desire or attempts to make portraits like those made in professional studios, we will find that very satisfactory results may be secured at home, even with a hand camera. The only real difficulties are the lighting of the subject and the exposure, and in these our previous indoor work will help us very much.

Let us take up daylight work first. We need a room with a window facing north, and having an open, unobstructed view, *i.e.*, not shaded by trees or nearby buildings. The higher the window the better. Sometimes a hall or other room which has a window placed high in the wall will be peculiarly advantageous. If we cannot have either of these, a window facing south, screened by a sheet of white muslin, will give us good results. As the light changes constantly from a south window the lighting here will, of course, be more difficult. Having chosen a suitable window we make

two or three actinometer tests at three, five, and six feet from the light source, calculating for the use of the largest stop our lens will allow, to find the most suitable place for the subject. Where it is possible, about five feet from the window, and slightly behind it should be chosen. This will give us a fairly soft round lighting with desirable shadows. If the light is poor we must work nearer to the window, but this will make it difficult to avoid harsh lighting. An experiment shows that the light is much too strong on the lower part of the figure. This is caused by the fact that our window is too low. We cannot increase its height, but we can cut away the light by blocking out half or one-third of the lower part of the window with a shawl or piece of dark drapery. The light should now fall upon the head and shoulders of the subject. If the shadow side of the face, regardless of the direction of the head, is too dark, a white sheet or other reflector brought to within three or four feet of the subject will throw a little light where needed. By careful manipulation of the reflector, we secure the desired illumination of the shadows, but if we overdo this, the result will be flatness. A little observation will tell us when the reflector may be dispensed with, when desirable, and how it should be placed. Roundness and modelling are the two points to be chiefly considered. When a willing model is at hand a few hours spent at odd times in the study of lighting the face and figure will be of great assistance.

It is important that the subject shall be lighted from one source only, so that if the room has two windows, one must be darkened. If the light given

by a single window necessitates too long an exposure, say more than twelve seconds, we must bring the subject as near to the light source as we can, and by the use of a fairly light background and side-screen, make a small studio around the window, so as to secure all possible illumination. This will generally be necessary when we attempt the portraiture of children indoors, or have to work with a hand camera lens whose largest stop is $f/16$ or $f/20$. With a rapid plate, and a lens working at $f/5.6$ or $f/8$, we can afford to get farther away from the light source. With a north light, and a bright day, the exposure at noon will rarely exceed five or six seconds. When the subject is dressed in dark clothes, or the room has dark furnishings, of course, the exposure will have to be lengthened. The lighting and disposition of the figure in portraiture are subjects much too difficult to be referred to in a paragraph. If, in the first we try to secure roundness and modelling, with a pleasing expression; and in the second, an easy, natural position, we will have made a good beginning. From this beginning by constant observation of lighting and posing as seen in everyday life, and a knowledge of pictorial composition we will very quickly grasp the essentials of these two details of portrait work.

As far as the background is concerned a curtain, rug, or screen will often prove altogether satisfactory, but for convenience in working a set of small backgrounds on a roller, which may be suspended on the wall in a moment, will be a profitable investment. Several makers make a special line of backgrounds for amateur portraiture at home. A few yards of

gray felt, sufficient to form a floor-cloth as well as a background, will be found useful. This comes in six feet widths and may be had at the dry-goods stores. The "wide width" cloths used for blinds may also be mentioned as offering excellent material for backgrounds. Those without a "finished" or glazed surface should be chosen, and the shades of gray will be most useful for general purposes. The influence of the background upon the portrait is a detail which deserves careful study, the characteristics of the portrait being altogether different when light and dark grounds are used. For this reason, when we have only one background, it should be one graduated from light to dark, so that we can reverse it and soften or emphasize the general effect in the picture as may seem desirable. The smallness of the image within the picture space is a practical difficulty encountered in at-home portraiture with the hand camera. This can be overcome by the use of a supplementary lens, placed in front of the lens attached to the camera, by means of which a larger image is obtained. The *Ideal Portrait* lens and the *Kodak Portrait Attachment* may be mentioned as desirable aids for this purpose.

Chapter VI

HOME PORTRAITS BY FLASHLIGHT

IN taking up flashlight portrait work at home, the the first essential is to get acquainted with the various forms of flashlight material and the apparatus needed for its use. What we want is sufficient light to enable us to get a portrait or a small group at night in an ordinary room. Either powdered magnesium or a compound of magnesium with other chemicals will give us this light, and the apparatus for their use fairly puzzles one by its almost infinite variety. Magnesium is perfectly safe in its handling and combustion, but slow in combustion unless we use what is known as a "blow through" lamp, by which the metal is projected through a flame. It also has the disadvantage of giving a great amount of smoke and dust after exposure. For these reasons it is little employed for portraiture in the home, although still much used in commercial work. Perhaps the simplest lamps for the combustion of magnesium powder are the *Proschlites*, in which an even, solid flame of light is obtained.

Compound flashlight powders are obtainable in the form of *flash-sheets*, *cartridges*, and the powder in bulk, usually packed in bottles. These are usually composed of powdered magnesium or aluminum with chlorate of potash or other chemicals which supply oxygen and

therefore give a "quicker" and more intense light. This shortens the exposure, and *compound* powders also yield less smoke and dust than magnesium alone. In handling or using *compound* powders two things should always be remembered: *First*, that they are explosive, and therefore must not be submitted to friction of any kind, and *second*, that they should never be used in a magazine or storage lamp, or in any lamp except one constructed for compound powder. The instructions and warnings sent out with the variety of powder used should also be carefully read and followed. With these precautions any make of flash powder may be used with safety and confidence.

For single portraits in a room with light furnishings Eastman's *Flash-sheets* are at once simple and efficient. Two or three small sheets, pinned together on a piece of white cardboard, so that the corners slightly overlap, will be found sufficient if properly placed. When ready open the lens, and touch a match to the sheets.

Among *Compound* flash powders in bulk I have used *Agfa Blitzlite* with complete satisfaction, but almost every other powder tried has more than met all my requirements. The new *Nichols* powder is an excellent mixture, as is the Eastman flash powder. It is a good plan to choose one and use it only, until its qualities and shortcomings are known, by which time we will be in a better position to appreciate others. What we need is a powder which will ignite easily and quickly, rapid in combustion and giving a powerful volume of light with as little smoke as possible afterward.

For the combustion of compound powders a lamp is

not necessary, although preferable, as offering greater efficiency and economy in the use of material. When used without a lamp the powder should be spread out in a train on a sheet of tin or other metal tray. At one end of the train insert a piece of loose, fluffy cotton batting about the length and thickness of a finger, and sprinkle a few grains of the powder at the end of the cotton where it enters the train. Let the other end of the cotton project an inch or so beyond the metal tray. When all is ready for the exposure, the tray being placed at the right point, light the end of the cotton with a taper, the lens having been opened previously. The cotton will burn at the rate of about an inch per second, so that there will be ample time to withdraw the hand. Among the lamps available for use with *Compound* powders the *Nichols*, *Spreadlite* and *Agfa* lamps offer abundant room for choice, both as to quality and price. The Agfa lamp is my choice.

A few hints from experience in the handling of *compound* powders *and* lamps may possibly save some reader from accident, hence I make room for the following notes: The conditions under which a compound flash powder will explode are not known. Generally speaking, ordinary care is sufficient, but beware of friction. In opening bottles or boxes of powder, cut the paper binding carefully, then, holding the bottle at arm's length, gently ease the lid off with a knife or envelope opener. Before replacing the lid or closing the bottle, blow off or remove any particles of powder which may have adhered to the bottle. When filling the lamp employed never pour the powder into the pan direct from the bottle. Use a small measure, cup,

or spoon, holding only the proper charge. Never fill the pan or powder-receiver while the burner, taper, or wick is lighted; always turn the latter away, or remove from the lamp when the pan is being filled. Never light the burner, taper, or igniting torch while it is over the powder. Never hold the exposure bulb in the hand when fixing the burner or taper over the powder. Always make sure that there are no curtains or other combustible materials near the point from which the flash is made. Always see that the lamp is securely placed when it is not held in the hand, lest the pressure of the bulb or a sudden jerk upset it at the moment of flashing. Always turn the subject's head away from the flash, and do not look at the light yourself at the time of the flash. Open the windows at top and bottom, and close the lens and plate-holder, as quickly as is possible after the flash has taken place. Beware of attempting flashlight portraits of people subject to hysterical fits or epilepsy. Keep the usual lights burning during the flash exposure.

Before attempting actual work with the flash, however, it will be needful to have a clear idea of the character of the lighting, in order to know where to place the lamp, and at what angle the light will fall. This may be gained by preliminary practice with gas or lamplight. As far as possible, the light should be above the level of the subject's head, and to one side, so as to fall upon the face at an angle of 45 degrees. If we place our model about six feet away from the source of light, where we ourselves stand, and study the changes in lighting as the model turns this way or that, the best lighting will be observed and may be

noted for future use. By placing the camera where we stood during our observations, and making the flash from the same point as the source of light used in our experiments, the desired lighting will be easily secured. With the subject six feet distant from the flash, and a lens working at *f*/16, about 45 grains of powder will be necessary for a single flash. If we use a screen between the flash and subject to diffuse the lighting, the charge should not be less than 60 or 70 grains. Children require less powder than adults.

Before leaving the subject of negative making by flashlight, the use of the light in the production of Christmas or other cards may be mentioned. Flashlight silhouettes come under this heading and are made made as follows: Across an open doorway, or at the opening between two connecting rooms, stretch a white sheet without creases or folds. In one room (behind the sheet, and at a distance of six or eight feet from it) arrange everything for a flash exposure. A single flash-sheet, or small cartridge, or ten grains of powder will suffice. In the other room pose the subject or subjects as near to the sheet as possible, and give them occupation. Thus two ladies may be sitting, busied with their embroidery, or a girl may be posed, standing, with her violin in characteristic attitude, or a baby may be seated at table in a high chair. In this same room focus the camera on the subject, lower the gas a little, uncover the lens and plate, and quickly go into the other room (behind the sheet) and make the flash. The result, on development, will be an attractive silhouette which, printed on *Velox*, *Cyko*, *Argo*, or any other paper, will form a

very desirable greeting card for a friend of the subject. The theme of the silhouette picture may be varied infinitely according to personal taste. Two men playing chess, a child with toys, or a woman trimming a hat are subjects which suggest themselves. In a similar way silhouettes may be made of the Christmas tree, or of decorative forms made by arranging branches, twigs, or flower-sprays upon the screen formed by the sheet.

Firelight effects have of late become very popular. They are produced in a simple manner. The subject having been posed and focused, a long and steady flash without smoke must be given. Proceed by taking flash paper (the Eastman flash sheets answer the purpose) in half-inch strips, and attach them to a board about 10 x 18 inches, an inch or so separating the strips. Arrange the strips in zigzag rows, so that they overlap at each end. The board being placed diagonally in one corner of the fireplace, the lower corner, when ignited, will make a steady white sheet of flame lasting several seconds, the smoke passing up the chimney. The paper should be ignited by means of a light attached to a long strip; this operation being performed so that your active hand does not appear in the picture.

Chapter VII

FLOWER PHOTOGRAPHY

THE photographing of flowers, fruit, and still-life subjects forms a delightful photographic hobby peculiarly adapted for pursuit at home. Properly handled, such subjects tell most interesting stories. The work involved is a pleasant occupation for the leisure hours, and brings us face to face with absorbing problems. The negatives used may be utilized in a variety of ways to give pleasure to others as well as ourselves, or for the decoration of the home after an attractive fashion. A few hints given here may be profitable and sufficient to set the reader thinking over the possibilities of the field. We need for the work only the apparatus included in the ordinary amateur equipment, a single or long focus lens, orthochromatic plates and a color screen, or the Imperial Non-Filter Ortho plates, which require no screen. If we have already mastered the meaning of orthochromatic photography the usefulness of color sensitive plates and color screens will be fully appreciated.

Flower photography, like portraiture, needs a quiet, diffused light. The best time for the work, therefore, is in the early morning or late afternoon, and the best place, a window facing north with the unobstructed light of the sky. When we work at a window lighted

by the sun, the window should be screened with translucent paper or tracing cloth, so that the light is diffused and softened. Softness of illumination, delicacy of modelling combined with the natural vigor of the subject under treatment, and the appearance of life, are the three points to be aimed for, and they depend upon the lighting and arrangement of the subject. Values of tone and texture are also important; stiffness or formality are things to be carefully avoided.

Generally speaking, a side or three-quarter lighting will give us the most favorable angle of illumination for most subjects. Sometimes, however, a top light alone, or a method of lighting in which the light is thrown upward with a mirror, will be advantageous. In most cases a white reflector to throw illumination into the shadows will be useful, but this must be carefully handled. A few experiments will tell us the value of these devices. Almost invariably, the light should come from one source only, but auxiliary illumination will, at times, be found very helpful to reveal the peculiar translucency of some flowers. To keep the flowers from drooping the stems may be kept packed with very wet moss, or we can seal the cut ends of the stems with wax, which will preserve them fresh for a long time.

The arrangement of flowers, singly or in groups, or sprays, or single branches, is an art difficult to teach in a few words. A touch here and there will often disturb or improve in an incomprehensible way. Simplicity, and an endeavor to reproduce the natural characteristics of the subject, are the keynotes to successful arrangement. Where several blooms of one

flower are photographed in extended formation, to form a panel or frieze, care must be taken to secure variety, and avoid monotony of design. Writing of this an experienced worker says: "Form and texture of flowers demand special attention, as a variety of blossoms crowded into one photograph destroy the effect of graceful tendrils and natural beauty, and present to the eye a blurred and meaningless mass. Quantity is not needed to make a picture, and upon no account have a mixture of garden and wild flowers. Plentiful array of foliage is an improvement in a floral study, and a few buds break the rigidity of the whole and display the beauty of the full-blown flower more prominently. A defaced or worm-eaten leaf mars the otherwise perfect plant, but that can be manoeuvred by replacing it with a faultless one with the assistance of a touch of gum.

Wild flowers, so delicate in texture and modelling, must be carefully dealt with, especially their foliage, as it is too often sparse and puny looking, demanding a sprinkling of wayside grasses to give variety to the fragile forms. The loveliest forms should be selected for photography, and single plants, growing in moist soil and partly sheltered from the burning heat of the sun, lend themselves splendidly to graceful effects. The first arrangement of a floral study will probably not be very encouraging, but it is principally from failures we learn. Practice makes perfection, and the gradual ascent is smoothed to the painstaking student. Flowers are generally troublesome to photograph growing—their homes are ofttimes unevenly lit and the background unsuitable; still, a natural representa-

tion of them can be secured, although they be cut blooms, by examining their haunts and carrying out the idea impressed on our minds on reaching home. Overcoming the initiative stages, other schemes of arrangement will readily present themselves to the true lover of the beautiful.

A simple and easy plan to display flowers naturally is to fill a long narrow box with damp sand, and using that for a support, arrange them according to the uniformity of the foliage and flowers. It would hardly be possible to steady the stems of the flowers out-of-doors unless they were propped up; thus damp soil is essential. A more realistic picture could be obtained if the front and sides of the box were covered with moss, to allow gradation in height for the numerous stems, instead of cutting them across in a line with the receptacle. View the design from various directions, and, if it pleases, place it about three feet from the background, thus getting rid of reflections.

The introduction of a glass bowl or vase will sometimes lend desirable support, in fact and tone, to a fragile subject, but natural forms are often most attractive of themselves without the addition of anything else. What, for instance, could be more desirable to the eye than a single sprig of mistletoe against a panel of grained oak, or a trail of ivy leaves decoratively disposed over a delicately tinted card? Similarly a spray of holly with berries, the long, graceful lines of golden rod, or a few Bermuda lily blooms, offer excellent material for the decoration of a panel or dado.

After lighting and arrangement, the background is a detail of much importance. Plain tinted grounds

are to be preferred, and the cartridge papers used for wall hangings, or some of the more delicate of cloths used for book-covers offer abundant choice. A large picture or canvas stretcher, on which coarse linen has been stretched, will serve as an admirable base for many different grounds. For light flowers a medium tone or dark ground is generally desirable, and for dark flowers a lighter ground. Extremes are to be avoided.

A very simple method of making photographic reproductions of decorative natural forms—such as details of flowers, ferns, small plants, leaves, seaweeds and grasses—is that described by M. Jules Carteron a few years ago. In this method no camera is necessary, a printing-frame and supply of sensitive paper being all that we require. A fairly large printing-frame is desirable as permitting of the arrangement of the subject: for printing papers we may choose from the familiar "blue print" paper, Eastman's *Sepia* paper, or any variety of print-out silver paper. The printing-frame should be fitted with a piece of clear plate-glass, and should be of the box pattern, so that we may use a certain amount of padding (soft blotting-paper) to secure perfect contact everywhere between the subject and the sensitive paper. To make the print, the plants, or leaves or grasses, as the case may be, are carefully spread out upon the glass with such arrangement as is possible or desirable. Next place upon the plant a sheet of "blue-print" paper of suitable size, allowing the paper to come into close contact with every part of the original. Over this place several sheets of blotting paper, so as to form a cushion; then close the frame

by means of the usual springs. Expose for about fifteen minutes in sunlight, and develop with water, which will yield an image of a pale blue color upon a background of a darker shade.

Such a print as this serves well for an herbarium of pictures, the dentition of the leaves being finely marked, and the shades of coloring very apparent. Of course the record so obtained is a negative record. What shows clear on the print is opaque in the plant, and *vice versa*. The silhouette detail of the plant is traced upon the paper by the solar rays in the same way as the silhouette of an object is traced by the X-rays upon a sensitive plate. Besides this, it would be difficult to make many prints exactly alike from the same original, for it is hardly possible to open the back of the frame without displacing the plant, or modifying the position of the leaves; for these reasons a second method is desirable. We therefore make a negative of the plant as before, only the material used for this negative should be *sepia* paper, as being thinner, more transparent, and consequently more sensitive than "blue print" paper. This paper negative we need simply wash in water if on *sepia* paper, and then dry.

In order to render the part printed more transparent and also to show more detail in the positive, place the paper against the glass of a window (the sensitive side against the pane), then with a fine brush charged with oil follow carefully the lines representing the plant on the back of the print, keeping rather within the outline, as oil always spreads. Use blotting-paper to remove all superfluous moisture. With this

as a negative, very many clean and well-defined positives can be obtained. On these two papers the image stands out in a kind of tobacco color upon a very slightly toned ground. This tobacco color is very favorable in representing many plants, and prints thus produced present the appearance of a dried plant mounted on a paper support.

The method is one which lends itself peculiarly to gum-bichromate printing, in which we may control the color of the print. By rendering the negative transparent it is possible to bring out the minutest details of the subject. Its possibilities for the decoration of *menu* and other cards, for suggestions helpful in design and similar purposes will be evident.

The oil used may be olive oil, but from experience the better kind to use is benzine mixed with a small quantity of glycerine.

Photographs of fruit, as a rule, are improved by the introduction of an accessory. Thus a fruit-bowl of oriental design, or a basket carelessly placed, or a little rough foliage will often help in the composition of the picture. Beware of any formal arrangement, and illuminate the group so that the natural forms are kept with only a touch of light here and there. The cast shadows are important and should be given careful attention in lighting. With most fruits a color-screen will be desirable, enabling us to retain the different tone values of the colors.

Still-life picture-making offers a wide range for the individual fancy. Groups of game; arrangements of oriental fans, draperies and feathers; a shield, with a bit of old armor and a gauntlet; a lamp, with an open

book and spectacles; a few toys and a pair of baby shoes and a corner of the nursery; or a favorite window-nook with my lady's desk; these suggest themselves as likely subjects which, treated pictorially, are well worth a plate.

In dealing with such subjects a full exposure is always desirable, and the development should be directed toward the securing of a rather thin, detailful negative which will yield the different values and textures of the subjects as the eye perceived them in the originals. In the making of prints the carbon process seems especially desirable, as giving us color, which oftentimes will add interest to the picture.

The wonderful range of colors, between thirty and forty different tints, permits selection to suit the subject. Added to this the three-color carbon process, giving a close approximation in effect to the originals, is peculiarly adapted to home practice requiring only patience and time to give very pleasing results.

Chapter VIII

ENLARGING AT HOME—DAYLIGHT

FOR many pictorial and decorative purposes the amateur will experience the need of a simple method of producing large pictures from his small negatives. This brings us to enlarging on bromide paper as among the things which may be easily and profitably done at home by daylight or artificial light. For daylight enlarging no special apparatus is needed, beyond the camera and lens used to make the original negative, and a couple of large trays for the development and fixing of the enlargement. Presuming that we do not intend an enlargement larger than 10 x 12 inches, these latter may be of vulcanite or japanned tin, and inexpensive.

To begin we require a small room to ourselves, with a window facing north, and giving us an unobstructed view of the sky. This window we make absolutely dark by fitting to it a light wooden framework covered with black cloth, or two thicknesses of brown paper. The room is now quite dark, and we must work by gaslight until we are ready to enlarge. In the window shutter, at a convenient height, we cut an opening exactly the size of the negative to be enlarged. At the two sides and bottom of this opening we glue three wooden laths, and fasten a drawing

pin in each, so that we can slide our negative in, upside down, and it will be held close to the opening. The film side of the negative must always face the back of the lens. Outside the window we place a sheet of white cardboard, or a mirror, at an angle of 45°, so that it will help us to throw as much light as possible through the negative at the opening in the shutter.

Returning indoors, we place a long table with one end close up to the window, and on it place a box of such a size that, when we place our camera on the box with the lens pointing into the room, the back of the camera (ground-glass removed) exactly covers the frame enclosing our negative. The light reflected by the cardboard outside now streams into the room, passing through the negative, camera, and lens. At the other end of the table we place a box on its end, and take care that it shall be perfectly upright. To the front of this box, facing the lens, we pin a sheet of white paper measuring about 11 x 14 inches. The image of the negative in the window appears (upright) upon this white screen. By moving the box nearer to or farther away from the lens we get the enlarged image of the desired size, 10 x 12 inches, but it is not sharp, *i.e.*, its details are not clearly and distinctly defined. By means of the focusing front of the camera, or by moving the box a little back or forward, we gradually get the enlarged picture of the right size and perfectly sharp; in other words we focus it correctly. The brightness or illumination of the image depends upon the intensity of the light outdoors, and the diaphragm used in the lens. We must use as large a diaphragm as

we dare, consistent with the desired degree of sharpness in the picture. If the image is not equally sharp all over, we must see whether the front of the box carrying the sheet of paper is perfectly parallel with the negative. This is essential. Another detail to be looked after is to make sure that no light enters the room save through the camera and lens. When we have got all these preliminaries arranged to our satisfaction we are ready for the actual work of enlarging on bromide paper, and from now on must work by the light of our dark-room lamp.

What is bromide paper? It is simply paper coated with a sensitive emulsion, exactly like that which, coated on glass, forms the sensitive dry plate used in making negatives. The emulsion on bromide paper, however, is much less rapid than that used in making plates. Thus we must handle bromide paper with all the care used in handling sensitive plates before exposure, and scrupulously keep it from white light until it has been exposed, developed, and fixed. Its manipulation is precisely similar to that employed in making negatives, but the character of the support (white paper) indicates that we must be more careful in the matter of cleanliness in our manipulation of paper than with plates.

Covering the lens, and working by the dim red light of the dark-room lamp, we open the package of bromide paper and take out a single sheet, which we cut into strips one and a half inches in width and the full length of the sheet. These we will use in making test exposures to ascertain the correct exposure for our enlargement from the negative in hand. To make a

test, pin one of the strips to the cardboard or sheet of paper on which the image was focused, in such a direction that it includes part of the shadows in the picture. Now cover three-quarters of the strip with a piece of brown or black paper and (supposing that we have bright light outdoors, a negative of medium density, and stop $f/16$ in the lens) give the quarter of the test strip an exposure of one-half minute. Cap the lens, uncover another quarter of the strip, and give it an exposure of another half minute. Repeat this operation with the remaining two quarters of the test strip, and replace the cap on the lens. We now have a strip which has received four different exposures. The first quarter of the strip has had two minutes exposure; the second quarter, one and a half minutes; the third, one minute; and the fourth quarter, one-half minute. Upon developing this test strip in the developer yet to be given, we will be able to judge as to the correct exposure required, to get a good enlargement. Very thin negatives will sometimes require only ten to thirty seconds; negatives of medium density from one-half to one and a half minutes; very dense negatives from one and a half to several minutes; after a little experience we will find ourselves able to judge the exposure required by the appearance of the negative on the screen.

When once we have determined the correct exposure for an enlargement from any particular negative, and have *also* taken the *actinometer time* of the light by exposing our Wynne meter at the opening in the window through which the light enters, we can obviate any difficulty in making other daylight enlargements from

this negative by marking on the edge of the negative the exposure time and the actinometer time. Thus suppose the time of correct exposure was fifteen seconds, and the actinometer time was only six seconds, we mark the negative 15 *Ex*/6 Act. If we divide the correct exposure time by the actinometer time we get two and one-half as the result. Then we know that, for all after enlargements of the same size from that negative, on the same brand of bromide paper, the exposure should be two and one-half times the actinometer time. After a few negatives have been tested and noted in this way we will be able to intelligently compare other negatives with these tested ones and judge, approximately, of the exposure they will require without the necessity for a special test with each and every negative.

Having determined the correct exposure required by the negative in hand, we return to the darkened room and pin upon the white card opposite the lens a full sheet of bromide paper, uncover the lens, and make the exposure. The lens is then covered, and the exposed print is removed from its support, enclosed in a light-tight envelope or tube, and taken into the dark room for development.

It is agreed that next to ferrous oxalate (which we will not trouble with) a combination of metol and hydroquinone gives the best developer for bromide paper. An excellent formula, originated by Yellott, is as follows: Dissolve 55 grains of metol and 55 grains of hydroquinone in 40 ounces of water; add sodium sulphite, 2 ounces, and sodium carbonate, 2 ounces. This forms a one-solution developer which may be prepared some time before it is needed, and

stored in 2-ounce bottles carefully corked. Two ounces of this solution gives us a sufficient quantity of developer for an enlargement not larger than 11 x 14 inches. Just before use the contents of one bottle should be diluted by adding from two to four ounces of water, and three or four drops of a ten per cent solution of potassium bromide. This developer can be used repeatedly, but if it is used too often will give greenish-black tones. Care must be used not to add too much potassium bromide; too little will result in degraded whites, and the print will acquire a foggy appearance; too much will give unsatisfactory tones. What we must seek to obtain is a rich black tone, like that of a good platinotype print. Amidol, citol, rodinal are other good developers for bromide paper.

To develop the enlargement, lay the print, face up, in an 11 x 14 tray and flood it with water for a few moments to prevent it curling; pour off the water and with a steady, even motion, flow the diluted developing solution over the whole of the print. In a few seconds the image will appear and gradually increase in detail and density. As soon as it reaches the desired strength, pour the developer off into an empty bottle (labelled *Used Developer*), rinse the print in running water and immerse it in the fixing bath. This latter should be freshly made by dissolving sodium hyposulphite, 3 ounces, in water, 16 ounces. In this the print should be quietly rocked for ten or twelve minutes, after which it should be removed and thoroughly washed for an hour and a half in running water.

Chapter IX

ENLARGING BY ARTIFICIAL LIGHT

TO make enlargements on bromide paper by artificial light with home-made apparatus demands a certain amount of contrivance and preparation. Once the apparatus is made and put in working order, however, its use is as simple as the manipulations employed in enlarging by daylight. The following description of a home-made enlarging lantern and its use is peculiarly adapted for home use. Procure a good, sound box 14 inches square, and another 10 by 10 by 3 inches. Remove the cover of the larger box and hinge it so that it will serve as a door. At the centre of the opposite end of the box cut an opening large enough to hold a pair of condensing lenses, such as are sold for magic lantern work. The diameter of the condenser should be equal to the diagonal of the negative used; its purpose is to gather the light and concentrate it upon the negative with uniform intensity at all points. Now cut a hole in the top of the box and insert an elbow of speaking-tube (tin), turning the horizontal piece with its opening toward the rear of the lantern. This will act as a chimney for the lamp or the illuminant used. Remove the cover from the smaller box and cut an opening in the bottom of the box a little smaller each way than the negative used.

Around three sides of this opening attach grooved strips of wood so that the negative may be inserted and held close to the box. This smaller box is now attached to the larger one so that the negative comes exactly opposite the centre of the condenser and about three inches in front of it.

In the larger box place a gas stand fitted with a Welsbach or other incandescent burner; or we may use any good oil lamp with a silvered reflector behind the flame. The stronger and purer the light the shorter the exposure necessary. The gas supply can be secured by rubber-tube connection with the house supply. The flame of the lamp or gas fixture should be in line with the centre of the condenser. If we now light the lamp, close the door of the lantern, and insert the negative, we will see that the latter is very strongly illuminated all over. The back of the camera, with the ground glass removed, is fixed to the front of this lantern so as to enclose the negative completely. The joints between the boxes and camera are carefully covered by strips of black paper and the apparatus made practically light-tight.

The conditions at this point are just what they were when we attached the camera to the opening in the window shutter in enlarging by daylight. The table and box support for the sheet of bromide paper are arranged as before; the lantern is placed at one end of the table, and the support for the enlargement at the other. The enlarged image is brought to the desired size and carefully focussed; the test for exposure made; the lens capped and the sheet of sensitive paper fixed to its support facing the lens and exactly at the

point of focus. The lens is uncovered, the exposure made, and the print developed as already described. It is unnecessary to say that, while the tests for exposure and the exposure itself are being made, the room must be absolutely darkened, and the sensitive paper handled with the same care that we would give to a plate before development.

When film negatives are to be enlarged from, either by daylight or artificial light, the manipulations are precisely the same as those employed with glass plates, except that the film must be enclosed between two pieces of glass free from all blemish.

Where expense is not to be considered as of importance an Ingento enlarging lantern, or a special daylight enlarging camera offers many advantages in convenience of manipulation. Among the many varieties of bromide papers obtainable those known as *Platino-bromide* and *Royal bromide* are perhaps the most desirable for pictorial purposes.

Sometimes, after we have enlarged a picture which in its original form had given us pleasure, it will be apparent that in the larger picture we need the interest of color. The cold gray-black tones are not equally suitable for all subjects. This difficulty can be overcome by toning the prints according to the subjoined formulae, for which I am indebted to Mr. E. A. Robins. The most permanent method of toning bromide prints is that of altering the silver of which the image is composed to silver sulphide. The substance is of a warm brown or sepia tint and is quite permanent in air, and it does not yield even to such a powerful bleaching agent as chloride. The print

must be carried farther in development than is usual, as toning tends to slightly reduce the intensity of the print. It should also be alumed after fixing and is then immersed, with or without previous washing, in the following bath: hypo, 2 ounces; alum (common), ¼ ounce; water, 15 ounces. The bath is heated to about 120° F. before the prints are immersed, and the operation should be conducted in a current of air or out-of-doors, as sulphur dioxide is given off and is very unpleasant. The prints tone slowly and gradually attain a sepia tone, which varies with the quality of the negative, a brilliant negative giving a richer sepia than a weak negative. After toning, the prints are washed and dried, any scum upon the surface being removed by a tuft of cotton wool and plain water or weak acid. Very fine effects can be produced with this bath upon "Royal" bromide paper, approaching carbon prints in quality.

The next most important toning bath is uranium, and although this is generally tabooed because of its so-called non-permanent qualities, if reasonable care be taken in the manipulations, no fault can be found with it in this respect. The bath that has produced excellent results in my hands is: potassium ferricyanide, 10 grains; water, 10 ounces; add—acetic acid, glacial, 4 drams; uranium nitrate (10 per cent solution), 2 drams. The mixed solution will not keep more than thirty minutes. Any tone can be produced from sepia to a Bartolozzi red. The print is afterward washed until all the yellow stain is removed, any left in reducing the permanency. Too much washing will remove all the tone, and as the process is one of

intensification, the prints should not be too dark. If the uranium-toned print be immersed in the following solution a sea-green tone is produced, which has a very charming effect for seascapes and moonlight scenes—Ferric chloride, 15 grains; hydrochloric acid, ½ dram; water, 6 ounces.

Bromide prints can be toned to a Bartolozzi red by means of Schlippe's salt, or thio-antimoniate of soda. The print is first bleached by immersion in the following—Potassium bichromate, 20 grains; hydrochloric acid, 2 drams; water, 10 ounces. It is then washed until free from all the yellow stain, and flooded with a solution of Schlippe's salt, 15 grains to 1 ounce of water; the print at once assumes a Bartolozzi red tone, and only requires washing to complete the operation; this is also an intensifying process, and so the print must be kept fairly light, and all hypo must be washed out before toning. To obtain a brilliant blue tone the following process is available, and is quite permanent: To a 10 per cent solution of ferric chloride add a 10 per cent solution of potassium ferricyanide until no more precipitate is formed. This precipitate is dissolved by adding a 10 per cent solution of potassium oxalate, giving a deep green solution quite clear, and in this the prints are immersed until the required tone is obtained. If the action be too rapid it may be slowed by diluting with water. The prints are washed and cleared by flooding with a 2 per cent solution of hydrochloric acid; they may be given a violet tone by placing in a 1 per cent solution of ammonia.

Chapter X

COPYING PRINTS AND DAGUERREOTYPES

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AFTER learning how to make enlarged prints from his small negatives, the amateur may profitably turn his attention to the copying of photographs and other pictures at home. The object to be copied may be an old Daguerreotype, tintype, or faded portrait, valued because of its associations, or it may be a painting, map, college diploma or manuscript we desire to reproduce. Again, we may want to make a slightly enlarged portrait of a single figure from a group. The work is very interesting and has few, if any, difficulties which cannot be easily overcome *provided that we can rack the bellows of our camera out beyond twice the focal length of the lens.* This is the principal difficulty in copying with a hand camera; its bellows' extension is so limited. As long as it is a question merely of making a small reproduction from a large original the difficulty does not appear. But when we attempt to make a copy the same size as the original (as to copy a 4 x 5 picture on a 4 x 5 plate), then we are confronted by the rule that *in such a case the distance between the lens and the original, and the distance between the lens and the focus-*

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ing screen, must both be fully twice the focal length of the lens.

Thus, in copying a 4 x 5 picture upon a plate 4 x 5, we can readily adjust the distance required between lens and object, but it is impossible to focus the image sharply because we cannot rack out the bellows far enough to give the required distance between lens and focusing screen. If we have a double-extension its extra length of bellows will help us out of the difficulty. Failing this, a short focus (wide angle) lens. fitted to our regular camera may enable us to get the desired size and sharpness in our copy. Or, if we do not possess either of these, we may make a wooden extension front and fit it into the front-board of our hand-camera in the place usually occupied by the lens. The lens, of course, must be fixed at the front end of this light-proof wooden extension front. In this way we gain the desired distance of separation between the lens and plate. A still simpler plan is to make use of a supplementary lens, such as the *Ideal Copying Lens*, which, slipped on at the hood of our regular lens, will shorten its focal length and so enable us to solve the problem.

The original to be copied is fixed in a vertical position near a window which faces an unobstructed north light. The lighting should be directed to evenly illuminate the whole of the picture to be copied, and we must be careful to avoid reflections, or any defect in lighting which will cause the grain or texture of the original to be too prominent. It is also essential that the centre of the lens be in line with the centre of the original being copied, and the original absolutely paral-

lel with the plate. The camera may be fixed to its tripod or placed upon boxes on a table; the first method is the best as obviating any possibility of movement during the immediate preparations before exposure. Focusing should be done with the largest stop, and a smaller stop inserted before exposure. In focusing we must look especially to the corners of the plate, to see that they are well lighted and that the definition there is as good as at the centre of the plate. The exposure, in a fairly bright light, a plate of medium rapidity and stop $f/32$ will range from 35 seconds to 5 minutes according to the subject and the amount of enlargement or reduction. Copies of printed matter will require exposure according to the condition and tint of the paper; thus a yellowed engraving will require three times the exposure given to a page from a new hymn-book. In copying manuscripts or any object having color a slow orthochromatic plate, or a ray-filter, offers practical advantages. The latter, used with a plain plate, is especially valuable in copying blue prints. A full exposure is always preferable to one slightly undertimed. In development, the points to be attended to are intensity and contrast. The grayness of tone peculiar to copied photographs is generally due to the want of intelligent development. Rodinal or citol and hydroquinone have all proved valuable in my own experience in this work. A good formula is as follows, A: Hydroquinone, 75 grains; sodium sulphite, 2 ounces; potassium bromide, 15 grains; water, 8 ounces. B: Caustic soda, 180 grains; water, 10 ounces. For use, take 2 ounces of A and add a quarter ounce of B. Dilute with water as the plate

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may indicate after the first appearance of the image.

The copying of daguerreotypes is a branch of work which the amateur can pursue at home with pleasure and profit. Much has been written about the subject, special stress being laid upon the necessity of "cleaning" or restoring daguerreotypes before their reproduction. As this is not invariably necessary, my first word will be a word of caution. The Daguerrean image, although in a sense absolutely permanent, is extremely delicate in structure, and may most easily be destroyed by an incautious touch. As a rule the Daguerrean artist did his work well, and if the original to be copied shows no signs of tarnish, it will be well to set about its reproduction without any attempt at restoration. If the surface under the glass cover in the little case shows dust, remove the glass and carefully clean it. Any dust on the surface of the picture image itself may be removed by very lightly passing a soft camel's-hair brush over it. On no account must the surface be touched with the fingers or the most delicate material, or the delicate film will be injured.

If the entire surface has become darkened or tarnished by the influence of the air upon the film, some restoration is of course essential to the best results. To effect this, remove the silvered plate from the case and place it, image uppermost, under a box lid or other protector from dust, etc. Now put a small piece of potassium cyanide (deadly poison) into a graduate, and pour over it an ounce or two of water. Holding the daguerreotype by the corner with a pair of pliers, rinse it in clear running water; then pour over it the

weak cyanide solution (a 3-per cent solution is usually employed), and return it to the graduate. Repeat this operation several times until the discoloration quite disappears. Within a few minutes the daguerreotype will appear as fresh and as brilliant as when first made. Wash well in running water, and then, before the surplus water has time to collect in tears upon the image, begin to dry the plate gradually over a spirit lamp, holding the plate in an inclined position so that it will dry from the uppermost corner. The plate must not be held too long over the flame or the thin silver film may separate from its copper support. The secret of success is in the use of pure water for the final washings, and the drying of the image without check or the formation of tears. The picture should now be restored to its case, and the edges secured with gold-beater's skin or gummed paper to thoroughly exclude the air.

In copying daguerreotypes in their cases it is usually advisable to turn them on one side. If fixed to an open board or support, reflections will undoubtedly give trouble, and these are not always visible on the ground-glass. It is therefore usual to copy daguerreotypes placed at the end of a fairly deep box lined with velvet, the lens being pointed at the picture through a hole cut in a black cloth flap which covers the front end of the box. Light is admitted through openings at the side of the box. The exposure is necessarily protracted. Care must be taken to avoid movement during the exposure. If the marks of the buffer—fine horizontal lines—are seen in the resulting negative, the plate should be placed vertically and rephotographed.

Chapter XI

PRINTS ON FABRICS AND IMITATION ENAMELS

MAKING prints on silks and fabrics is essentially a specialty adapted for home work. It is not always easy to get good prints, but the following method by A. J. Jarman can be relied upon if the manipulation advised is followed carefully. A first essential is absolute cleanliness, and a second, the use of distilled water in mixing solutions. Make a salting and sizing solution as follows: Soak 125 grains of hard gelatine in 25 ounces of water. Add common salt 100 grains; ammonium chloride, 25 grains; magnesium lactate, 125 grains. Warm the solution so that the gelatine completely dissolves; soak the fabric in it and suspend to dry. Mix sensitizing solutions as follows: No. 1: nitrate of silver, 120 grains; water, 4 ounces. No. 2: citric acid, 50 grains; white sugar, 50 grains; distilled water, 20 ounces. Soak the fabric in No. 1 for three minutes; drain until surface is dry and draw it carefully through No. 2. Hang up to dry, when it is ready for printing. This sensitizing should be done in the dark-room or in yellow light. The fabric should be kept under pressure, when it will keep good for about a week, but it is better if used fresh. The print is made in an ordinary frame.

If the fabric is to be examined during printing, it should be attached by light touches of glue to a card. It is a good plan to sensitize a small extra strip of material which may be used as a test on the negative to be printed from. Having made the test, the picture can be printed by time. Prints should be masked with a clean edge or vignette, and a margin of fabric left all around in case the picture is to be sewn into a cushion. Wash the print in several changes of water and tone in saturated solution of borax, 3 ounces; water, 30 ounces; chloride of gold, 2 grains. As soon as toning is complete, wash in two changes of water and fix in a 10 per cent hypo bath. Fixing takes about ten minutes. After well washing in clean cold water suspend by clips to dry. If the fabric is very thin the preliminary salting solution may be 50 per cent stronger; otherwise the formula as given will answer every purpose for silks and other fabrics.

To those familiar with carbon printing the making of imitation enamels, *i.e.*, photographs on china, plates, pottery, etc., offers an attractive home hobby. A carbon print from a good negative is transferred onto a porcelain or other vitreous support, and then, instead of being submitted to the great heat necessary for fusion, it is japanned—that is, the surface of the image is covered with a transparent varnish. The first stages of the work present no unusual difficulties, for they are merely carbon work. A tissue containing a maximum of pigment with a minimum of gelatine should be chosen. This is to a certain extent porous, and by allowing the first coating of varnish to penetrate tends to bind all more closely to the support.

Any color of tissue may be used and the picture may be tinted or colored if desired, before being japanned.

A good brand of amber or copal varnish should be used, of the kind known as "stoving varnish," or it may not stand the heat of japanning. Amber varnish is slightly the harder, but copal is preferable as being colorless. A very thin layer of this varnish is spread on the mounted tissue with a camel's-hair brush. This first coat should be mixed with an equal quantity of turpentine—it will then spread thinner. Brush marks will disappear during the stoving. One coat must be thoroughly dry and hard before a second is applied; if not, the unequal contraction may in the final stages cause innumerable little cracks. Let the plaque dry in a warm dust-proof place. When a sufficient thickness of glaze has been obtained by repeated coatings and dryings, the enamel is ready for stoving. This may be done in a gas-oven or the kitchen stove. A gentle heat, not less than 150° F. or more than 200° F., should be kept up for five or six hours. The enamel is then allowed to cool. When cold its surface must be polished, first with pumice powder and finished off with putty powder.

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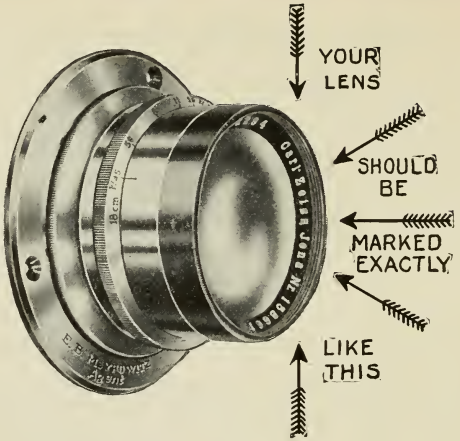

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